Major comments:

1. The knowledge gap on preferential flow paths that necessitates the current study is not clear.

Reply: Thanks a lot for your comments.

The first paragraph of introduction talks about the basic knowledge of preferential flow, its unique features compared with uniform flow, and its potential influences on hydrological processes. In this way, we sought to emphasis that preferential flow is of great importance in hydrological studies, and thus needs to be better understood. The first paragraph could be a preface of the following statements, since study on the controlling factors of preferential flow is one of the major ways to understand preferential flow.

We will improve our presentations in revision, so as to have the paragraphs more logically connected.

2. The introduction appears to be a summary of previous studies on preferential flow occurrence. A persuasive introduction with a clear hypothesis or research question to improve upon the previous studies should be included in Introduction.

Reply: We will illustrate more to fill the gap between previous studies and our objectives.

Basically, this study was initiated from two considerations. (1) It would be helpful in understanding the processes of subsurface hydrology, if we get the key factors that control the occurrence of preferential flow. Lots of studies have been carried out on this topic. However, contradictory results were obtained in different cases, e.g., the cases of Wu et al. (2014) and Hardie et al. (2013). And to our knowledge, no study on this topic has been carried out in northern China with sub-humid climate and poorly developed underlying soil. Hence, we think this study could be a complementary to the understanding of controlling factors of preferential flow; meanwhile, it would be helpful in understanding hydrological processes of the study area. (2) By far, there are many methods for the detection of preferential flow, but in-suit method is rather limited. The method using wetting front as an indicator, which was proposed by Lin and Zhou (2008) and later improved by Hardie et al. (2013), could be an alternative option. Since this method has been on applied in only two or three cases to our knowledge, it would be of interest to apply it in our study area, where climate and surface condition are different from previous cases.

3. From the results, it appears that frequency of the occurrence of preferential flow was not correlated to antecedent soil moisture content variation (very small) within a site, but it has a correlation when the frequency is compared between different sites. This result suggests that a small variation in antecedent moisture content within a site can trigger preferential flow. Is there a thresh-hold moisture content that triggers preferential flow in a site? Between sites, there could be different confounding factors, so I wonder how useful it is to make a general statement about the relationship between antecedent moisture content and frequency of preferential flow.

Reply: We are afraid there may be some misunderstandings here.

We don't think it can be concluded that a small variation in antecedent soil moisture at a site can trigger preferential flow. Given the limited varying range of soil moisture at a specific site throughout the monitoring period (see Figure 11), no significant correlation between the frequency of preferential flow and antecedent soil moisture can be obtained. This means that frequencies of preferential flow at various antecedent soil moistures are not significantly different from each other, at least, there is no trend of the frequency versus antecedent soil moisture. Therefore, we don't think there is a threshold of soil moisture that "triggers" preferential flow, at least the threshold is not within the varying ranges of observed soil moisture.

We agree that there may be some confounding factors between the sites, and this is the reason why we cannot draw a conclusion about the influence of antecedent soil moisture on occurrence of preferential flow, though Figure 10 shows a significant correlation between the two. The later part of Section 4.2 tries to clarify that the time-invariant components, such as slope gradient and surface cover, may have played a essential role in controlling soil moisture as well as occurrence of preferential flow at a specific site.

Minor comments

4. Page 1, line 9: "Observation was conducted" is vague and it sounds confusing. Be specific.

Reply: Thanks for your suggestion. Besides the background information of the study area, e.g., topography, soil texture, canopy coverage, soil moisture was observed at 12 sites, 9 of which were equipped with rain gauges.

We will specify the "observation" in revision.

5. Page 3, line 8: What observations were carried out? Be specific. Or write a non-vague sentence. E.g., we monitored rainfall intensity, runoff, soil moisture content. . . at the catchment.

Reply: Thanks for your comment. We will not talk about the "observation" in this section after revision. Instead, we will start the paragraph with "Figure 1 illustrates the Xitaizi experimental catchment, which is …", and the "observations" will be specified in the following sections.

6. Page 4, line 6: Titration method – need a reference that describes more about the method.

Reply: Thanks for your suggestion. This method follows the procedures suggested by the National Standard of P.R.China (GB9384-88). The procedures are generally as follow:

(1) Soil sample was air-dried before the test.

(2) 0.1-0.2g (accuracy of $\pm$0.0001g) of soil sample was taken into a 150ml triangular flask, and was well mixed with 10ml 1mol/L $K_2Cr_2O_7$.

(3) The triangular flask was then placed into boiled water for 30min after being installed with an air set pipe at the top. And the triangular flask was moderately shacked every 5min during this period.

(4) The sample was cooled to room temperature. The air set pipe was rinsed before being uninstalled, and the leachate was collected by the triangular flask. Volume of the mixture in the flask was controlled to be 60-80ml.

(5) 3-5 drops of phenanthroline were added into the flask.

(6) The sample was then titrated by the 0.2 mol/L $FeSO_4$ solution, and the titration should be stopped when the color of the sample turned brownish red.

(7) The same procedures should be applied to a controlled group (0.500g of SiO_2).

(8) Finally, content of organic matter could be obtained by the follow equation:

$$\mathrm{X}(\%) = \frac{(\mathrm{V}_0 - \mathrm{V})\mathrm{C} \times 3 \times 1.724 \times 100}{\mathrm{m}}$$

Where X is the content of organic matter, %; V_0 is the volume of $FeSO_4$ solution consumed in testing SiO_2, ml; V is the volume of $FeSO_4$ solution consumed in testing soil sample, ml; C is the concentration of $FeSO_4$ solution used for titration, mol/ml; m is the weight of air-dried soil sample, g. Additionally, the digit 3 refers to the ¼ molar weight of carbon atoms, g/mol; and 1.724 is the coefficient that transfers the weight of organic carbon to the weight of organic matter.

7. Page 4, line 11: Data showed. Where to find those data? Be more specific about which data the readers should look for here.

Reply: "Data" here refers to Table 2. We will specify the illustration in revision.

8. Page 8, line 1: Grammar issue.

Reply: We will have a native English speaker to help us on the language issue. We will check through the manuscript, and improve the presentations in revision.